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2.2)

1) $\lim_{x\to 8} 7 = 7$

$\lim_{x\to 0^+} \pi = \pi$

$\lim_{x\to -2} 3x = -6$

$\lim_{y\to 3^+} 12y = 36$

3) given

$\lim_{x\to a} f(x) = 2$

$\lim_{x\to a} g(x) = -4$

$\lim_{x\to a} h(x) = 0$

d) $\lim_{x\to a} [g(x)]^2 = \left[\lim_{x\to a} g(x)\right]^2 = (-4)^2 = +16$

g) $\lim_{x\to a} \frac{3f(x) - 8g(x)}{h(x)} = \frac{3\lim_{x\to a} f(x) - 8\lim_{x\to a} g(x)}{\lim_{x\to a} h(x)} = \frac{6+32}{0_{ish}}$

h) $\lim_{x\to a} \frac{7g(x)}{\underset{4}{2f(x)}+\underset{-4}{g(x)}}$

dne, $+\infty$, $-\infty$ } IDKW

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10) $$\lim_{t \to -2} \frac{t^3+8}{t+2} = \lim_{t \to -2} \frac{(t+2)(t^2 - t(2) + 2^2)}{t+2}$$

$$= \lim_{t \to -2} t^2 - 2t + 4 = (-2)^2 - 2(-2) + 4$$

$$= 12$$

$$a^3 + b^3 = (a+b)(a^2 - ab + b^2)$$

$$a^3 - b^3 = (a-b)(a^2 + ab + b^2)$$

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12) $\lim_{x\to 2} \frac{x^2-4x+4}{x^2+x-6} = \cancel{\frac{0}{0}}$ idk yet

$= \lim_{x\to 2} \frac{(x-2)^2}{(x-2)(x+3)} = \lim_{x\to 2} \frac{x-2}{x+3} = \frac{0}{3} = 0$

13) $\lim_{t\to 2} \frac{t^3+3t^2-12t+4}{t^3-4t} = \frac{8+12-24+4}{8-8}$

$= \frac{0}{0}$ uh oh

$$\begin{array}{r|l} & t^2+5t-2 \\ t-2 & t^3+3t^2-12t+4 \\ & -(t^3-2t^2) \\ \hline & 5t^2-12t+4 \\ & -(5t^2-10t) \\ \hline & -2t+4 \end{array}$$

$\lim_{t\to 2} \frac{t^3+3t^2-12t+4}{t^3-4t}$

$= \lim_{t\to 2} \frac{(t-2)(t^2+5t-2)}{t(t-2)(t+2)}$

$= \lim_{t\to 2} \frac{t^2+5t-2}{t(t+2)} = \frac{12}{8} = \frac{3}{2}$

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If I have $\frac{3}{0}$, I am wrong.

I can't divide by zero.

If, however, substitution into a limit gives me $\frac{3}{0}$ nonzero#, then I know the answer will be, $+\infty$, $-\infty$, or DNE.

I determine which one of those by considering the two ONE sided limits. [and then comparing them]

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Q: How do I determine if "I" am heading toward $+\infty$ or $-\infty$?

* Recall that a limit is a y-value.
* The limit "is" the intended y-value as my gaze approaches a particular x-value.

* Assuming I have narrowed the ans. down to DNE, $+\infty$, or $-\infty$ ...

As my gaze moves toward "$x=a$", consider the sequence of y-values associated with the x-values I look at

$[x: a_1, a_2, a_3, a_4 \ldots \ ; y: f(a_1), f(a_2), f(a_3), \ldots]$

If "all" the y values (after a certain point) are negative, my answer is $-\infty$;

If "all" the y-values (after a certain pt) are positive, my answer is $+\infty$.

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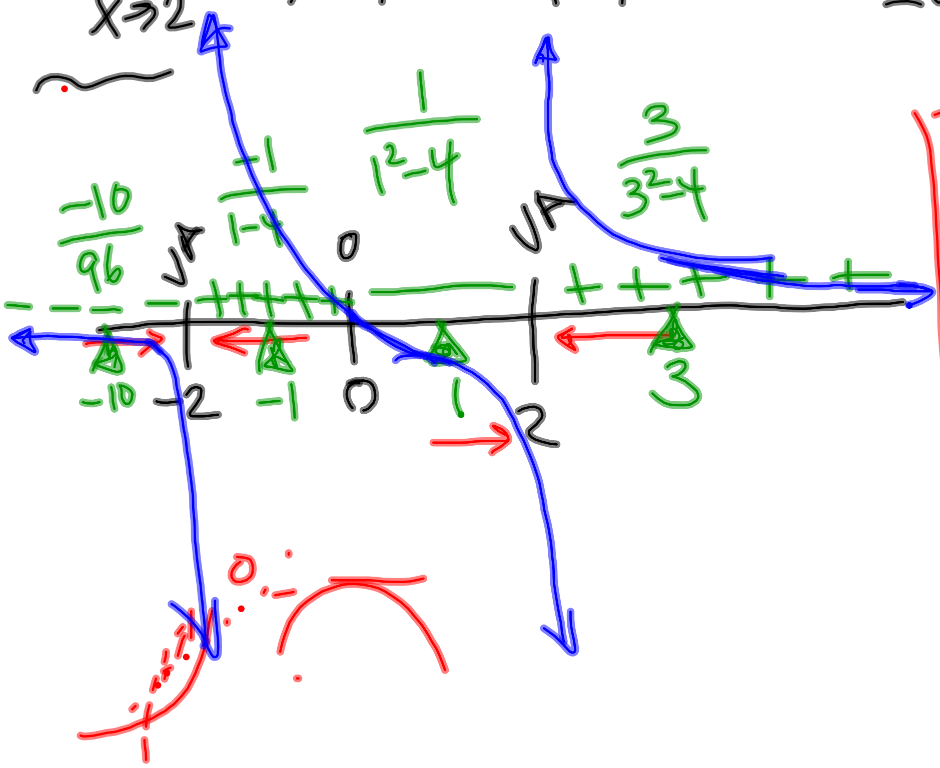
19) $\lim_{x \to 2^-} \frac{x}{x^2-4} = \frac{2}{4-4}$ uh oh $\left\{ \begin{array}{l} +\infty \\ \text{DNE} \\ -\infty \end{array} \right.$




$\frac{x}{x^2-4} = \frac{x}{(x-2)(x+2)}$

find zeros of top

$x=0$

find zeros of bottom

$x=-2, +2$

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2.2) 31)

$$\lim_{t_1 \to 0.5} \frac{-16t_1^2 + 29t_1 - 10.5}{t_1 - 0.5}$$

$\hookrightarrow \frac{0}{0}$ cancel zeros

$$\begin{array}{r} -16x + 21 \\ x - 0.5 \overline{\big) -16x^2 + 29x - 10.5} \\ -(-16x^2 + 8x) \\ \hline 21x - 10.5 \\ -(21x - 10.5) \\ \hline 0 \end{array}$$

$$\lim_{t_1 \to 0.5} -16t_1 + 21$$

$= -16\left(\frac{1}{2}\right) + 21$

$= -8 + 21 = \boxed{13}$

$-16t_1^2 + 29t_1 - 10.5 = (t_1 - 0.5)(-16t_1 + 21)$

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29) $\lim_{x \to 9} \frac{x-9}{\sqrt{x}-3} = \lim_{x \to 9} \frac{(\sqrt{x}+3)(\sqrt{x}-3)}{(\sqrt{x}-3)}$

$= \lim_{x \to 9} \sqrt{x}+3 = 3+3$

$= 6$

$\frac{(x-9)(\sqrt{x}+3)}{(\sqrt{x}-3)(\sqrt{x}+3)}$

$\frac{\cancel{(x-9)}(\sqrt{x}+3)}{\cancel{(x-9)}}$

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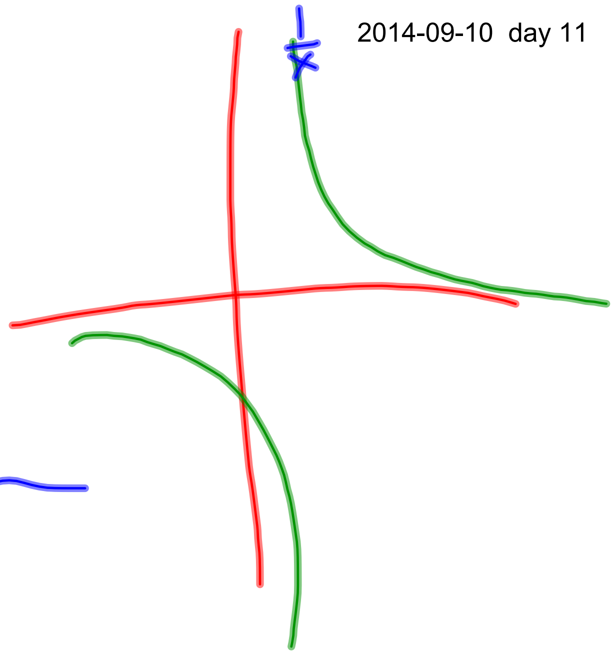
27) $$\lim_{x \to 2^+} \frac{1}{|2-x|}$$

DNE
$+\infty$
$-\infty$




Fix the top $\frac{\text{top}}{\text{bottom}}$

As the bottom goes to zero,
the entire fraction "blows up" $\begin{Bmatrix} +\infty \\ -\infty \end{Bmatrix}$

As the bottom "blows up" $\begin{Bmatrix} +\infty \\ -\infty \end{Bmatrix}$,
the entire fraction approaches 0.
[[from what side?]]